

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

REC'D 12 APR 2005

WIPO PCT

Applicant's or agent's file reference FP4642PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA416)	
International application No. PCT/IB 03/05459	International filing date (day/month/year) 27.11.2003	Priority date (day/month/year) 29.11.2002
International Patent Classification (IPC) or both national classification and IPC H02P6/00		
Applicant DOLPHIN ELECTRIC HOLDINGS INC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I  Basis of the opinion
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the International application
- VIII  Certain observations on the International application

Date of submission of the demand 24.06.2004	Date of completion of this report 11.04.2005
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Kanelis, K Telephone No. +49 89 2399-7558



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB 03/05459

**I. Basis of the report**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-11 as originally filed

**Claims, Numbers**

5 (part), 6-10 as originally filed  
1-4, 5 (part) filed with telefax on 24.02.2005

**Drawings, Sheets**

1/4-4/4 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-10
	No: Claims	-
Inventive step (IS)	Yes: Claims	1-10
	No: Claims	-
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	-

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB 03/05459

- 1). Following documents are referred to:

D1: CH615773

D2: EP1077523

D3: GB683152

D4: GB719668

D5: US4706456

- 2). The independent device claims 1 and 2 still refer to a rotating electrical machine operated by a mechanical actuator and switches and do not describe inter-related products or alternative solutions on how to control the current direction through the winding with respect to the position of actuator and switches. Thus it is recommended to draft a single independent apparatus claim followed by appropriate dependent claims to fulfill Art. 6 PCT.
- 3). D1, which is considered as the closest prior art, discloses a:
- rotating electrical machine comprising:
  - a housing (pp. 3, col. 1, lines 11-14);
  - a shaft (15) in fig. 1 mounted rotatably within the housing;
  - a rotor (11) fixed to the shaft and providing a magnetic field;
  - a stator (12) positioned about the rotor within the housing and having a winding (13, 14);
  - a switch (S1, S2) mounted within the housing and having a first position (A) for allowing current in one direction through the winding and a second position (R) for allowing current in an opposite direction through the winding (pp. 3, col. 1, lines 36-42);
  - a mechanical activator (40) movable with or by the shaft (15, 41) and acting on the switch (W, S1, S2) so as to move it between the first (A) and second (R) positions when the winding is so aligned that current-inducing effects of the magnetic field on the winding are at or near a minimum (fig. 2, pp. 3, col. 2, line 44 - pp. 4, col. 1, line 15.)
- 4). Claim 1 is distinguished from D1 in the
- mechanical activator movable by the shaft and acting on the switch so as to move it between the first and second positions when the winding is so aligned that current-inducing effects of the magnetic field on the winding are at or near a minimum.

**INTERNATIONAL PRELIMINARY  
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- 5). D1 uses two shafts (15) and (41), while the mechanical activator (13) in claims 1 and 2 is operated by the motor shaft (3). Since there is no obvious transition from one arrangement to the other, claims 1 and 2 appear as new and inventive (Art. 33 (2) and (3) PCT).
- 6). Operating the three-phase synchronous machine with a cam in block commutation mode with 120° on-periods and 60° off-periods for the current is not derived in an obvious manner from the prior art, so claims 3-10 appear as new and inventive (Art. 33 (2) and (3) PCT).

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**CLAIMS:**

1. A rotating electrical machine comprising:
  - a housing;
  - 5 a shaft mounted rotatably within the housing;
  - a rotor fixed to the shaft and providing a magnetic field;
  - 10 a stator positioned about the rotor within the housing and having a winding;
  - a switch mounted with the housing and having a first position for allowing current in one direction through the winding and a second position for allowing current in an opposite direction through the winding;
  - 15 a mechanical activator movable by the shaft and acting on the switch so as to move it between the first and second positions when the winding is so aligned that current-inducing effects of the magnetic field on the winding are at or near a minimum.
- 20 2. A rotating electrical machine comprising:
  - a housing;
  - a shaft mounted rotatably within the housing;
  - a rotor fixed to the shaft and having a plurality of poles made of ferromagnetic material;

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a stator positioned about the rotor within the housing and having a winding;

a switch mounted within the housing and having a first position for allowing current in one direction through the winding and a second position for allowing current in an opposite direction through the winding;

a mechanical activator movable by the shaft and acting on the switch so as to move it between the first and second positions.

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3. The electrical machine of claims 1 or 2 wherein the switch has a third position for not allowing current through the winding, and the mechanical activator moves the switch to the third position between the first and second positions.

4. The electrical machine of any one of claims 1 to 3 wherein the mechanical activator comprises a cam mounted about the shaft and a cam follower communicating with the cam and with the switch.

5. The electrical machine of claim 4 wherein the cam has four portions for moving the switch to the first position for  $1/6^{\text{th}}$  of a cycle and then to the third position for  $1/3^{\text{rd}}$  of the cycle, and then to the second position for